

WE CLAIM:

1. A single component moisture activated liquid ebonite composition having a total mass percentage of 100 comprised of:

- 5 liquid unsaturated rubber of about 15-85 mass percentage;
sulfur of about 10-50 mass percentage;
a vulcanization activator of about 5-35 mass percentage;
a vulcanization accelerator of about 0.2-2.0 mass percentage;
carbon black of about 1-10 mass percentage;
10 a first silane of about 5-10 mass percentage, said first silane converting said liquid unsaturated rubber to alkoxy functionality;
a second silane of about 1-10 mass percentage, said second silane scavenging moisture originally present therein;
a third silane of about 1-10 mass percentage, said third silane containing sulfur
15 linkages and reacting with said sulfur during vulcanization;
a catalyst of about 0.01-2 mass percentage, said catalyst promoting reaction of said liquid unsaturated rubber and said first silane;
a filler of about 0-60 mass percentage;
additives of about 0-10 mass percentage; and
20 a diluent or solvent of about 0-30 mass percentage.

2. The single component moisture activated liquid ebonite composition of claim 1, in which said first silane has a formula of

- $R_nSi X_{(4-n)}$; wherein
25 Si is a silicon atom;
X is an alkoxy group;
n is between 1 to 3; and
R is an alkyl radical containing a reactive functional group selected such that said first silane is capable of chemically bonding to said unsaturated liquid rubber while leaving said
30 alkoxy group intact.

3. The single component moisture activated liquid ebonite composition of claim 1, wherein said second silane contains alkoxy groups and wherein said second silane is substantially non-reactive during treatment with said first silane.

4. The single component moisture activated liquid ebonite composition of claim 1, in which said third silane has a formula of:

$R_nX_{(3-n)}Si-S_m-SiX_{(3-n)}R_n$; wherein

R is an alkyl radical containing a reactive functional group;

X is an alkoxy group;

Si is a silicon atom;

n is between 0 to 2;

m is between 2 to 8.

5. The single component moisture activated liquid ebonite composition of claim 1, wherein said liquid unsaturated rubber is selected from the group consisting of polybutadiene, polyisoprene, poly(butadiene-co-acrylonitrile), poly(isobutyl-co-isoprene), and poly(ethylene-co-propylene-co-diene) having at least two reactive functional groups.

6. The single component moisture activated liquid ebonite composition of claim 5, wherein each of said reactive functional groups is selected from the group consisting of hydroxyl, epoxy, anhydride, isocyanate, and amine.

7. The single component moisture activated liquid ebonite composition of claim 1, in which said liquid unsaturated rubber having a formula of

$F_1-(CH_2-CR_1=CH-CH_2)_x-(CH_2-CHR_2)_y-M_z-F_2$; wherein

R₁ is H or CH₃;

R₂ is H, CH₃, C₂H₅, phenyl, nitrile, acrylate, or acetate;

F₁ is H, CH₃, OH, COOH, NH₂, NCO, epoxy, vinyl, acrylate, or anhydride;

F₂ is H, CH₃, OH, COOH, NH₂, NCO, epoxy, vinyl, acrylate, or anhydride;

M is a monomer selected from the group consisting of noborene, hexadiene, and cyclopentadiene; and

x, y, and z are integers and $x > 0$, $y > 0$, and $z > 0$.

8. The single component moisture activated liquid ebonite composition of claim 7, wherein

$$5 < x+y+z < 150.$$

5 9. The single component moisture activated liquid ebonite composition of claim 7, wherein

$$x / (x+y+z) > 0.4.$$

10. The single component moisture activated liquid ebonite composition of claim 1, wherein

10 said liquid unsaturated rubber having a molecular mass of about 200 to about 10,000.

11. The single component moisture activated liquid ebonite composition of claim 1, wherein

a portion of said sulfur is provided by an organic sulfur donor compound.

12. The single component moisture activated liquid ebonite composition of claim 1, wherein

15 said vulcanization activator is a metal oxide, a metallic salt, or a combination thereof.

13. The single component moisture activated liquid ebonite composition of claim 12, wherein

said metal oxide is zinc oxide or magnesium oxide.

20 14. The single component moisture activated liquid ebonite composition of claim 12, wherein

said metallic salt is zinc stearate.

15. The single component moisture activated liquid ebonite composition of claim 1, wherein said vulcanization accelerator is selected from the group consisting of thiurams, tetramethylthiuram disulfide, tetrabutylthiuram disulfide, tetraisobutylthiuram disulfide, tetrabenzylthiuram disulfide, tetraalkylthiuram disulfide, 2-mercaptobenzothiazole, benzothiazyl disulfide, N-oxydiethylenebenzothiazole-2-sulfenamide, N-cyclohexyl-
5 benzothiazole-2-sulfenamide, N-tert-butyl-2-benzothiazolesulfenamide, diphenylguanidiene, N,N'-ditolylguanidiene, aldehyde-aniline condensation products, bismuth dimethyldithiocarbamate, cadmium dimethyldithiocarbamate, cadmium diethyldithiocarbamate, copper dimethyldithiocarbamate, lead dimethyldithiocarbamate, selenium dimethyldithiocarbamate, selenium diethyldithiocarbamate, Tellurium
10 dimethyldithiocarbamate, zinc dimethyldithiocarbamate, zinc diethyldithiocarbamate, zinc di-n-butylthiocarbamate, zinc diamyldithiocarbamate, thiodiazine, diethylthiourea, trimethylthiourea, dibuylthiourea, and zinc isopropyl xanthate.

16. The single component moisture activated liquid ebonite composition of claim 1,
15 wherein said single component moisture activated liquid ebonite composition does not require premixing and is activated by ambient moisture.

17. The single component moisture activated liquid ebonite composition of claim 16, wherein said ambient moisture has a relative humidity of about 38 - 45%.

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